OIPE JC88
APR 2 2 2004
PATENT & TRADEMARK OFFICE

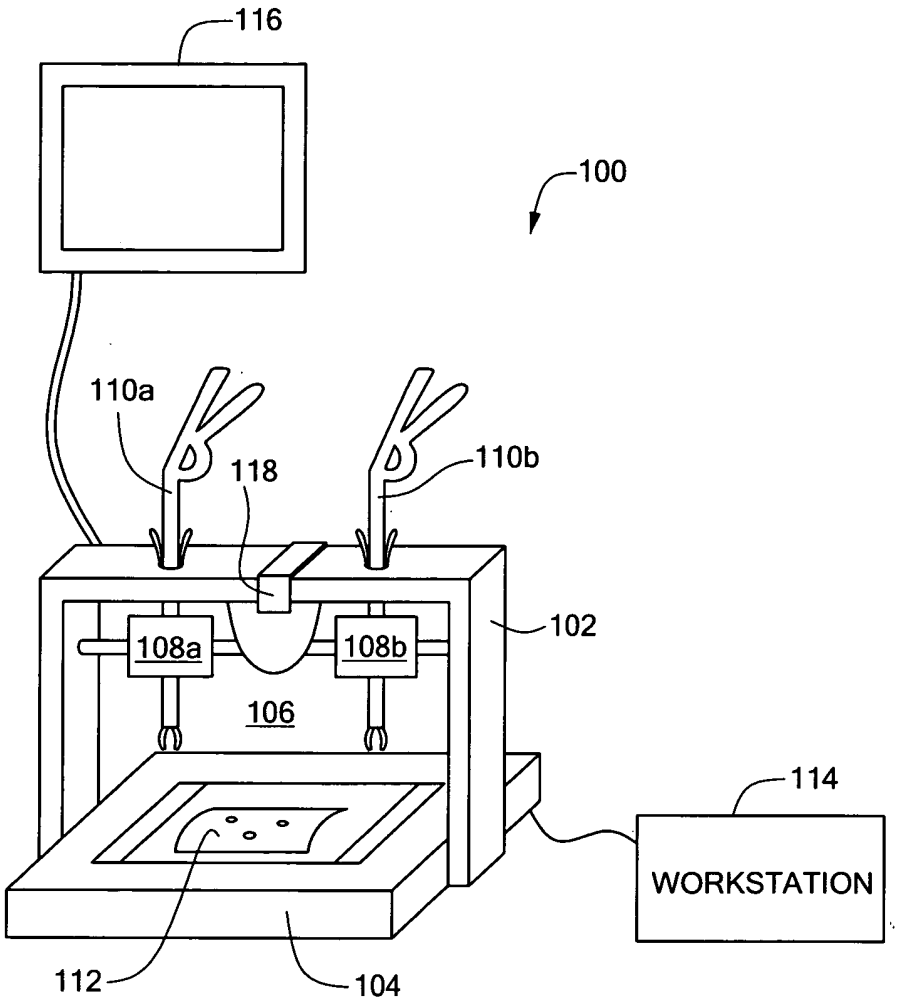


FIG. 1

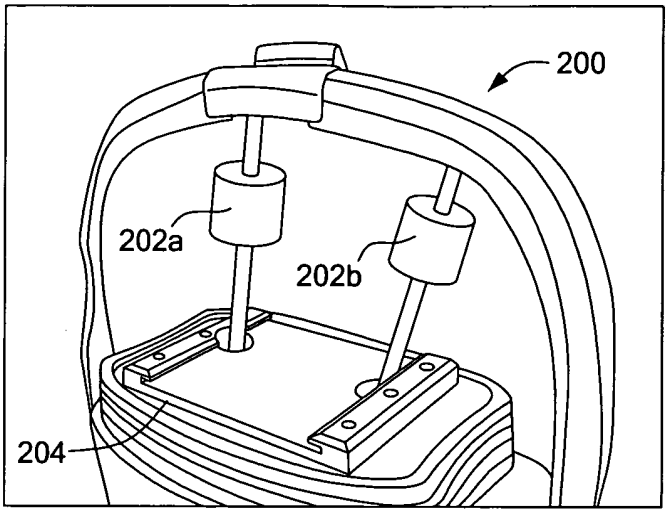


FIG. 2A

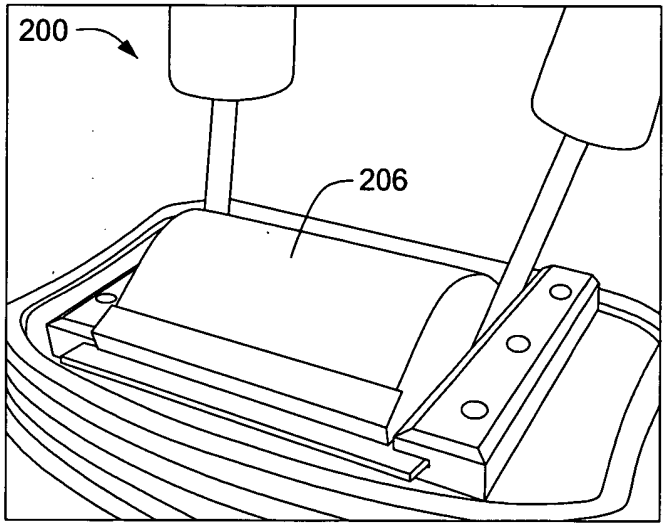


FIG. 2B

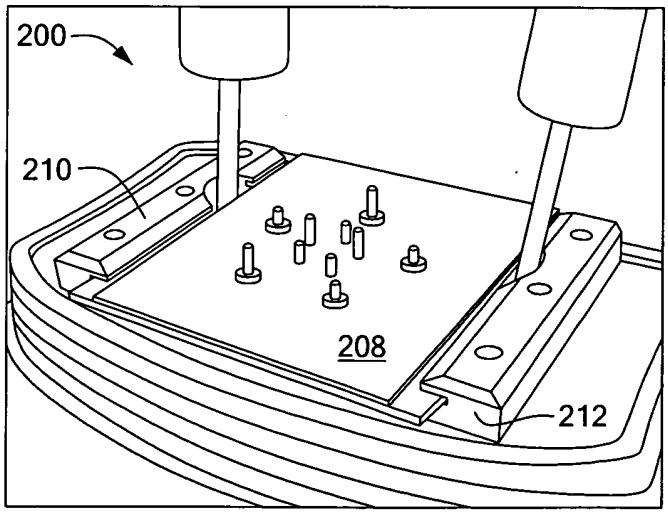


FIG. 2C

FIG. 3A

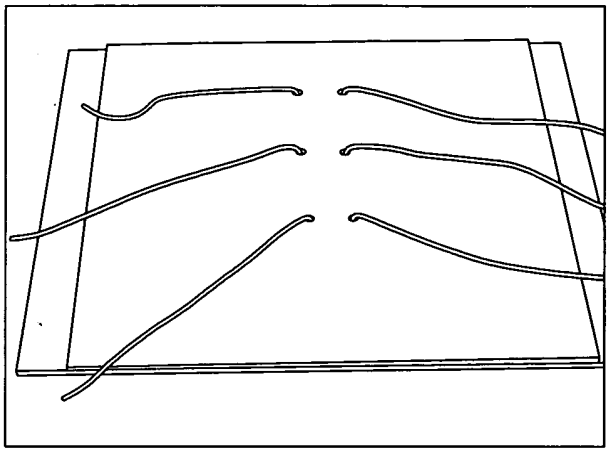


FIG. 3B

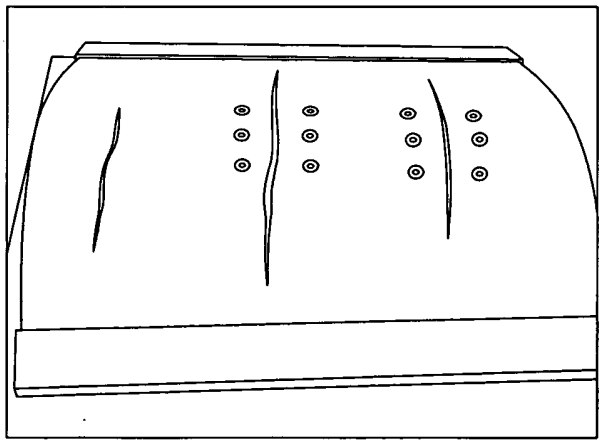
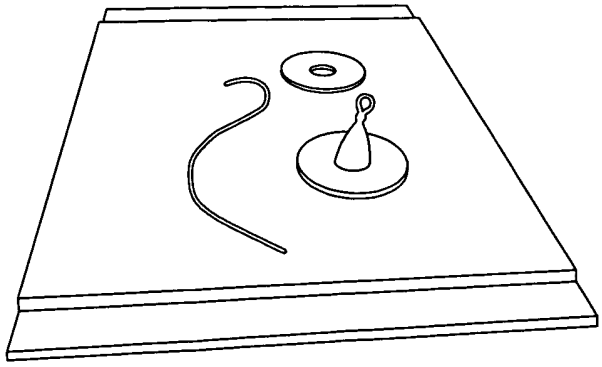


FIG. 3C



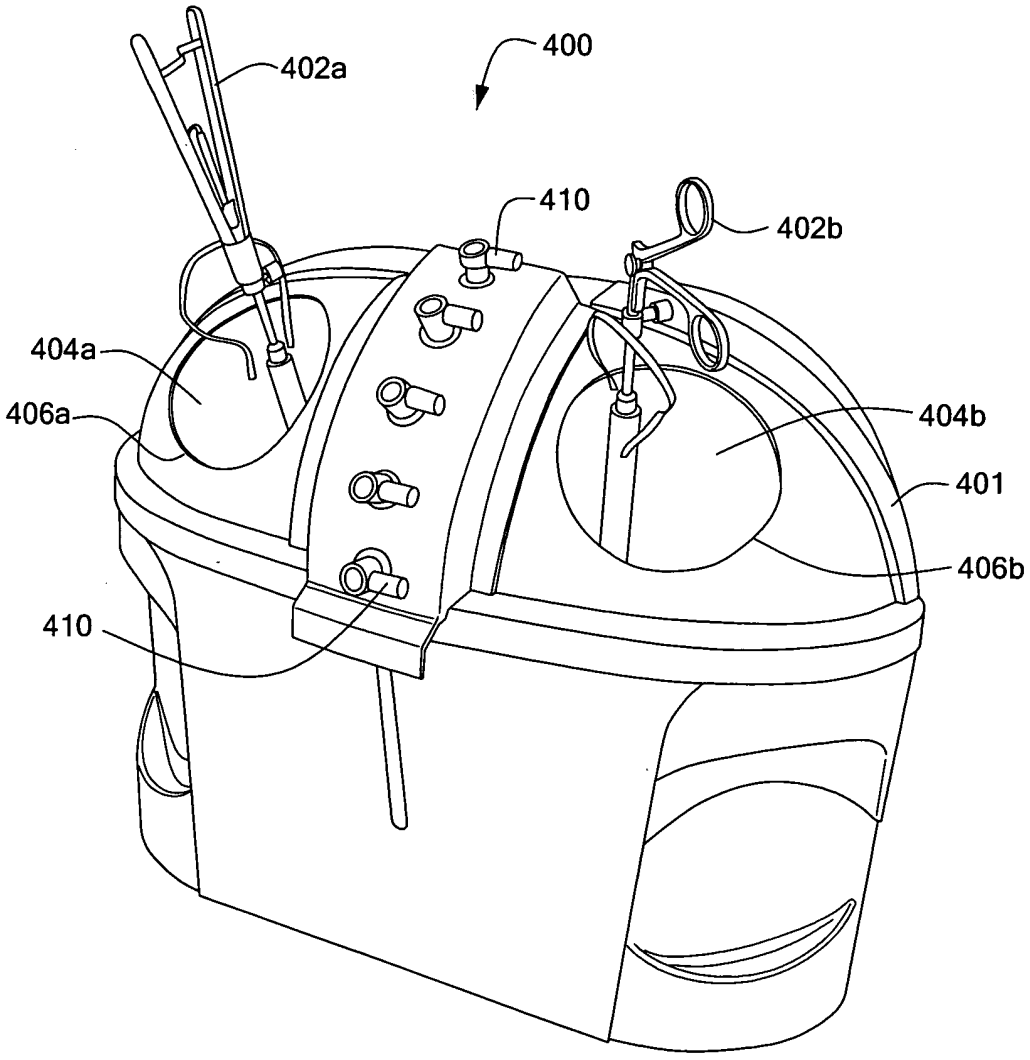


FIG. 4

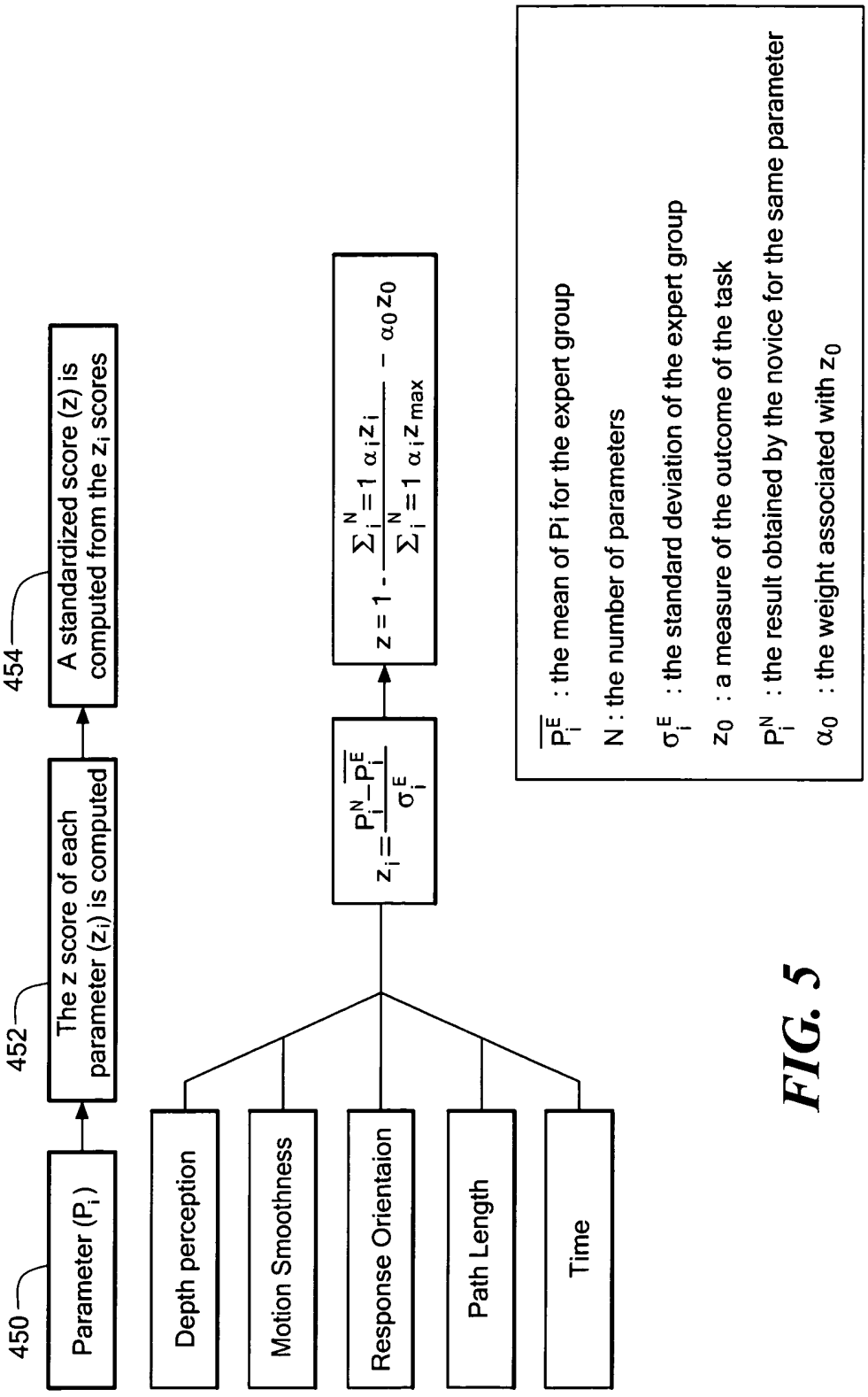

450
Parameter (P_i)
Depth perception
Motion Smoothness
Response Orientaion
Path Length
Time
452
The z score of each parameter (z_i) is computed
$z_i = \frac{P_i^N - \overline{P_i^E}}{\sigma_i^E}$
454
A standardized score (z) is computed from the z_i scores
$z = 1 - \frac{\sum_{i=1}^{N} \alpha_i z_i}{\sum_{i=1}^{N} \alpha_i z_{max}} - \alpha_0 z_0$
$\overline{P_i^E}$: the mean of Pi for the expert group
N : the number of parameters
σ_i^E : the standard deviation of the expert group
z_0 : a measure of the outcome of the task
P_i^N : the result obtained by the novice for the same parameter
α_0 : the weight associated with z_0

FIG. 5

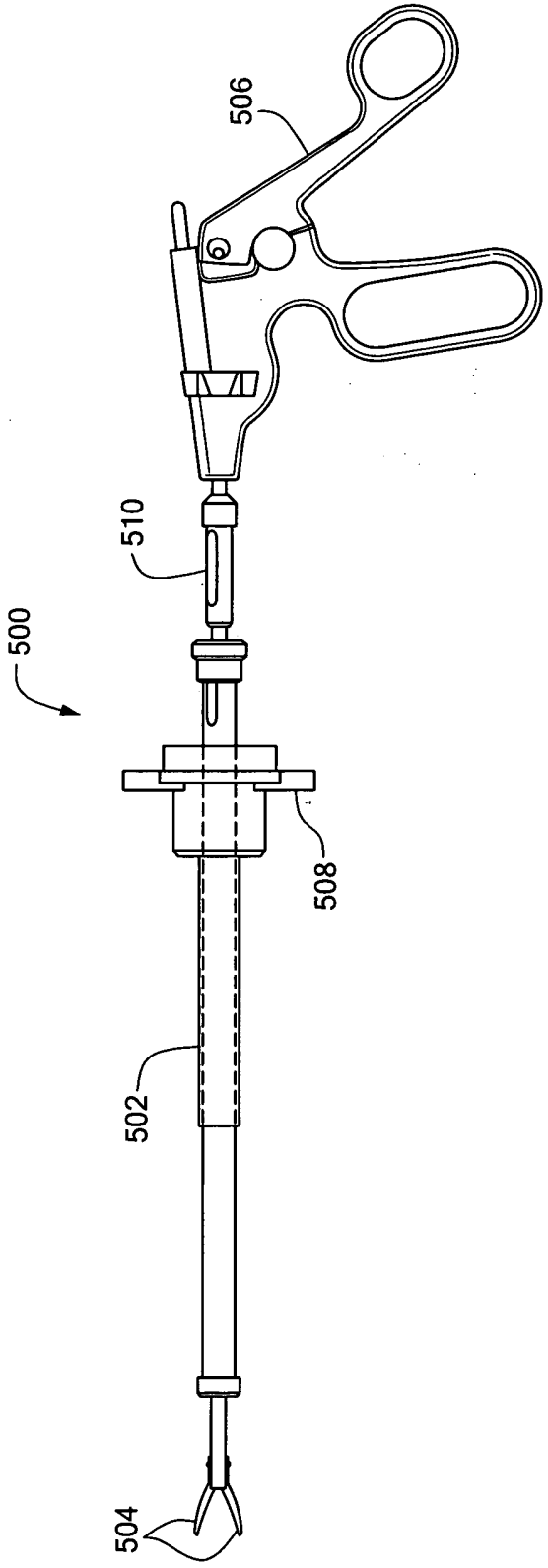


FIG. 6

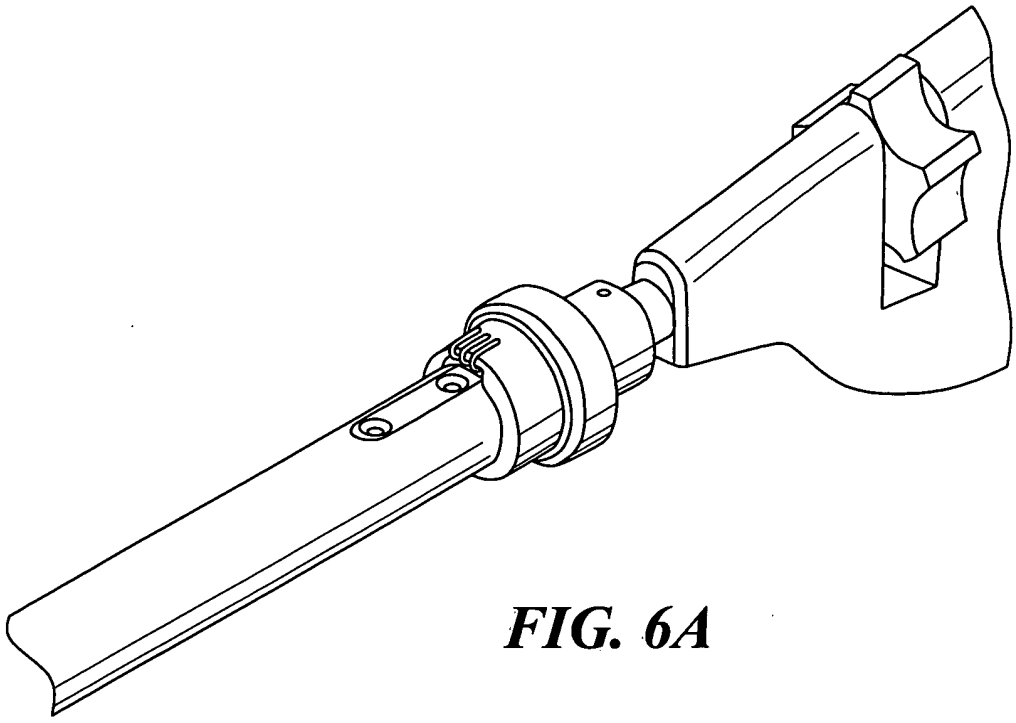


FIG. 6A

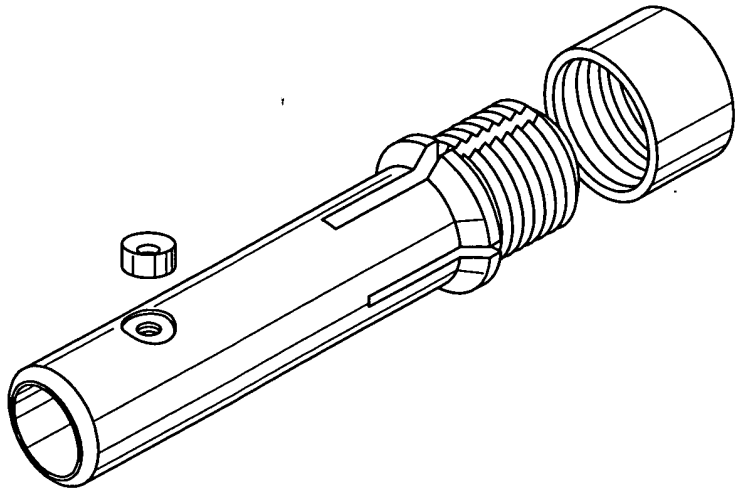


FIG. 6B

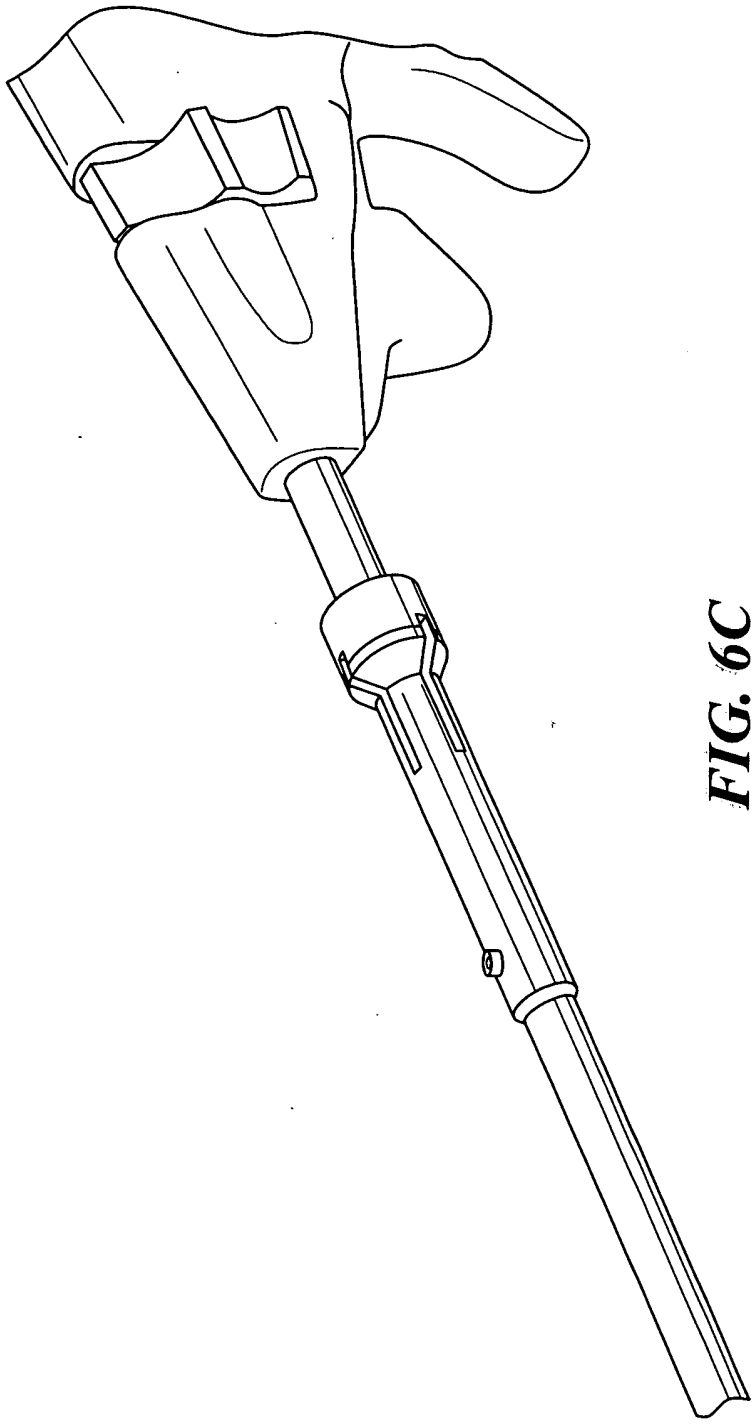


FIG. 6C

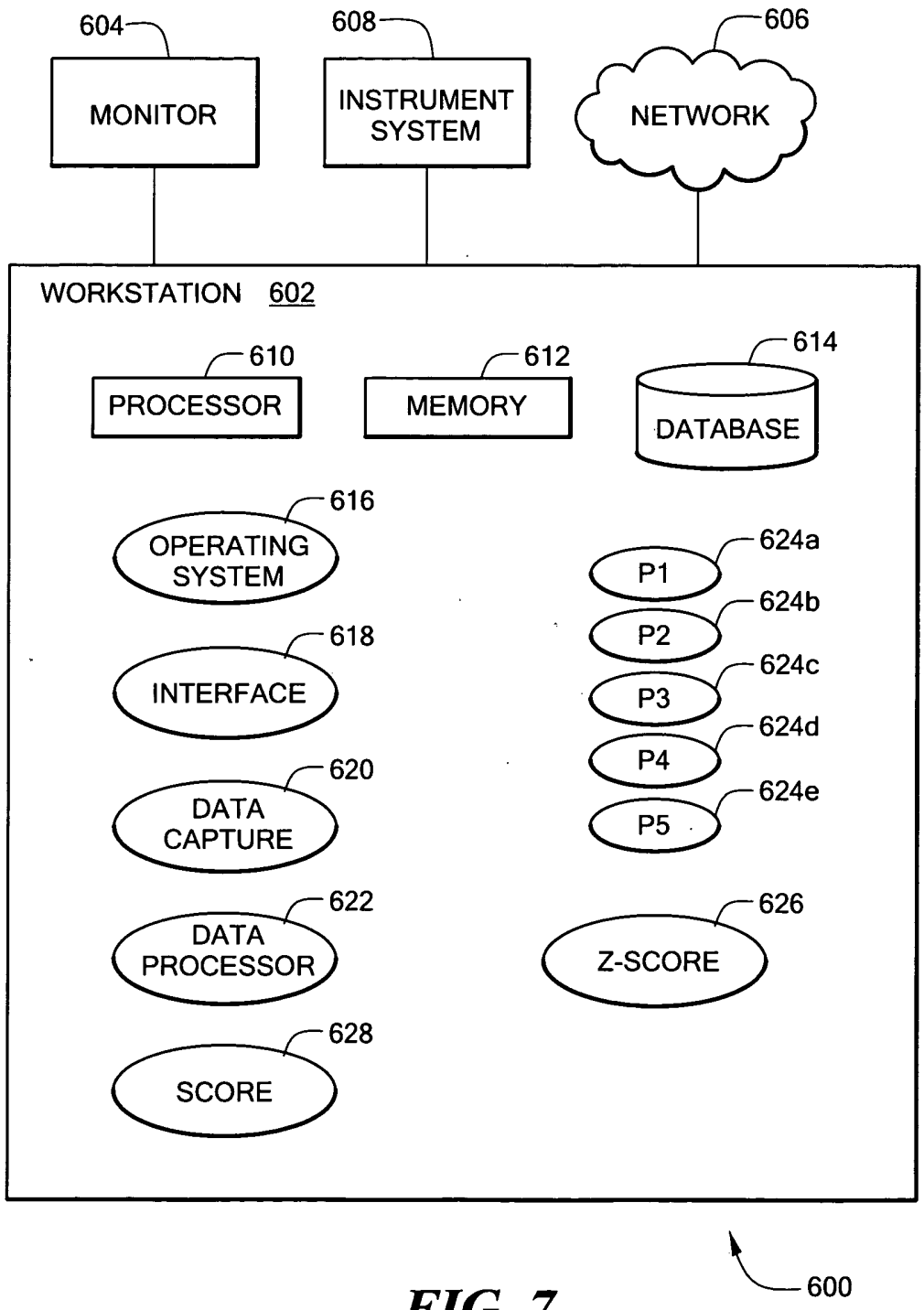

604
MONITOR
608
INSTRUMENT SYSTEM
606
NETWORK
WORKSTATION 602
610
PROCESSOR
612
MEMORY
614
DATABASE
616
OPERATING SYSTEM
618
INTERFACE
620
DATA CAPTURE
622
DATA PROCESSOR
628
SCORE
624a
P1
624b
P2
624c
P3
624d
P4
624e
P5
626
Z-SCORE
600

FIG. 7

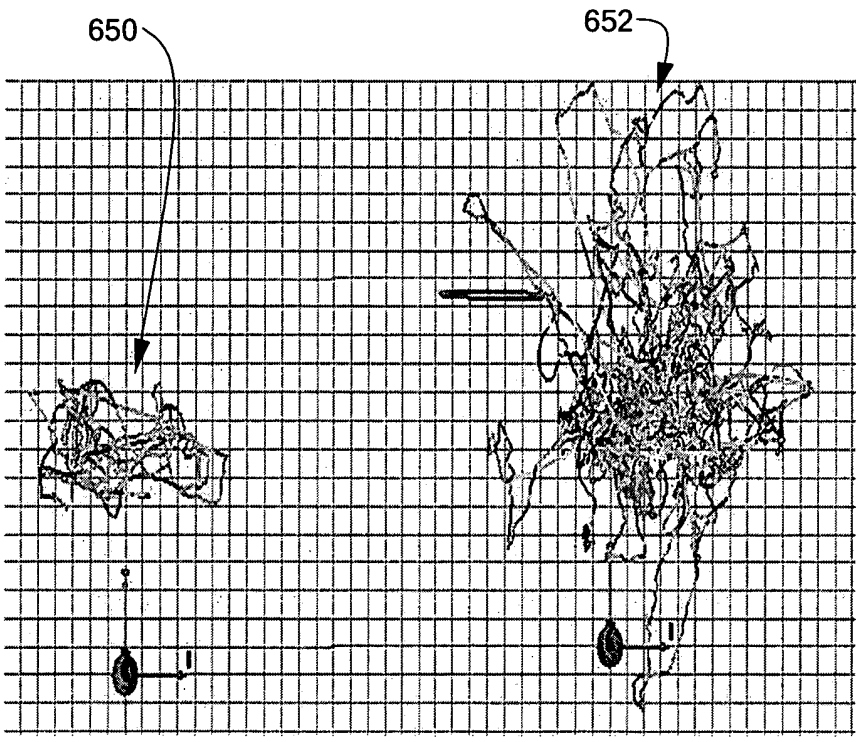


FIG. 8

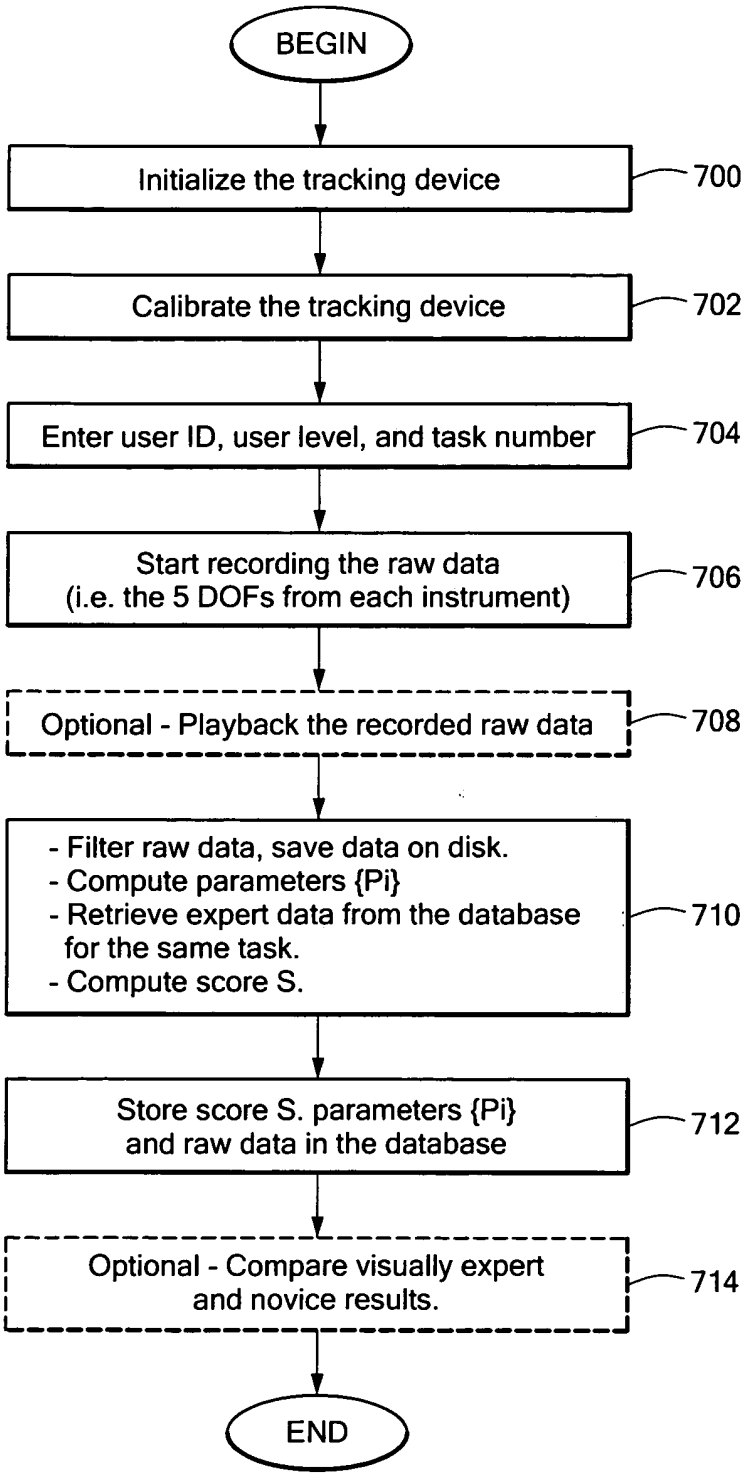

BEGIN
Initialize the tracking device
700
Calibrate the tracking device
702
Enter user ID, user level, and task number
704
Start recording the raw data
(i.e. the 5 DOFs from each instrument)
706
Optional - Playback the recorded raw data
708
- Filter raw data, save data on disk.
- Compute parameters {Pi}
- Retrieve expert data from the database for the same task.
- Compute score S.
710
Store score S. parameters {Pi}
and raw data in the database
712
Optional - Compare visually expert
and novice results.
714
END

FIG. 9

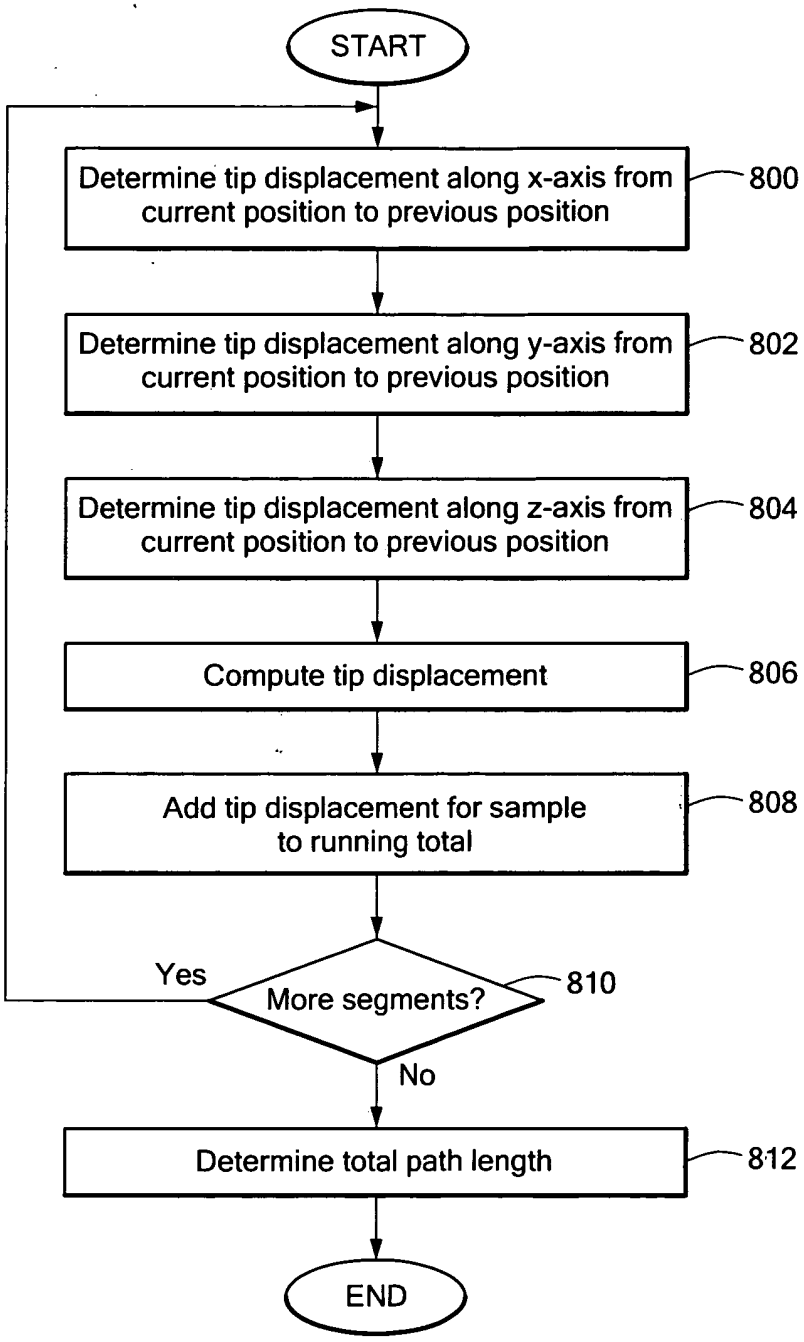

START
Determine tip displacement along x-axis from current position to previous position
800
Determine tip displacement along y-axis from current position to previous position
802
Determine tip displacement along z-axis from current position to previous position
804
Compute tip displacement
806
Add tip displacement for sample to running total
808
Yes
More segments?
810
No
Determine total path length
812
END

FIG. 10

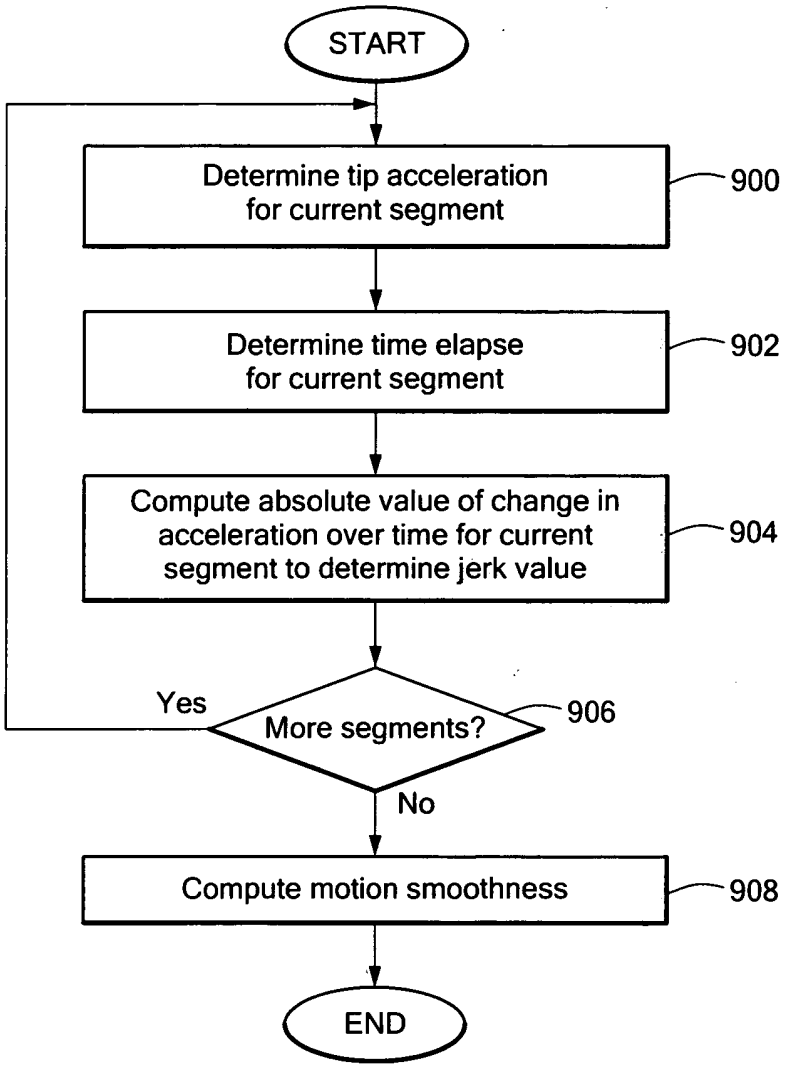

START
Determine tip acceleration for current segment
900
Determine time elapse for current segment
902
Compute absolute value of change in acceleration over time for current segment to determine jerk value
904
Yes
More segments?
906
No
Compute motion smoothness
908
END

FIG. 11